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THE HISTORICAL BACKGROUND OF ENTOMOLOGY IN RELATION TO THE EARLY DEVELOPMENT OF AGRICULTURE IN CALIFORNIA

(Continued from page 58)

BY E. O. ESSIG

Early California Insect Type Localities

The entire State of California may be looked upon as a gigantic type locality from which thousands of new species and genera of insects have been collected during the past one hundred years. The earliest important collecting grounds were those surrounding the military strongholds at the Presidios of Monterey and San Francisco, Fort Ross, and New Helvetia or Sutter's Fort. Later, during the early American occupation, extensive collections were made at Fort Tejon, Fort Yuma, and Camp Independence. Some of these are the localities chiefly referred to in this chapter.

Later collectors operated, first about the larger cities, and then into the adjacent open country. The Sierra have ever lured the naturalists and even to the present day the more inaccessible portions are being searched for additional rare or undescribed species. It will probably take another fifty years before all parts of the state will have been explored entomologically and all of the more conspicuous insects have been taken. As most of the collecting has been done during the summer periods, there is yet much to be accomplished during the autumn, winter, and early spring, when certain species appear, and are wanting later or earlier in the season. So far little has been accomplished in the way of collecting and classifying the apterous orders, Thysanura and Collembola, as well as certain other groups of insects such as the Corrodentia, Ephemerida, Neuroptera, Trichoptera, Strepsiptera, and Parasitic Hymenoptera. California is still a virgin and productive field for the systematic entomologists and will be for years to come.

Fort Ross,[1] established as a trading post and farming center by the Russians in 1812, became a rendezvous for many noted Russian collectors and, with the territory between Bodega Bay and Mount St. Helena, is the type locality of a great many common California and western insects particularly Coleoptera. Here collected J. F. Eschscholtz (1824), F. P. Wrangell (1833-5), G. Tschernikh (1833-41), F. Fischer (1840-41), E. L. Blaschke (1841), I. G. Vosnesensky (1840-41), and others. Among the prominent early entomologists who have described types from these localities are J. F. Eschscholtz, P. F. M. A. Dejean, M. de Chaudoir, G. Fischer von Waldheim, V. I. Motschulsky, C. G. Mannerheim, and E. Menetries. The settlement of Fort Ross was abandoned by the Russians in 1841 and soon reverted to a semi-wild condition in which state it has maintained practically all of its native insect fauna even to this day. Later coleopterists from all over the United States have sought specimens from this type locality. Among these may be mentioned J. L. LeConte, G. H. Horn, T. L. Casey, Carl Fuchs, E. C. Van Dyke, F. E. Blaisdell, and others. Blaisdell and Van Dyke, by their early and painstaking work, have taken practically all of the known species of this and the San Francisco Bay Region and their large collections, presented to the California Academy of Sciences, have preserved them for posterity.

San Francisco Bay Region was the chief collecting ground for all of the early explorers and naturalists. The Presidio, the Mission Dolores and the area between, now known as "Chinatown," were the earliest localities explored as were also the Pueblo Santa Clara, Mission San José and the Mission San Rafael. Natural conditions no longer exist in any of these localities except possibly the last two. The others are entirely changed, being largely encompassed by cities. Among the early collectors here were: Eschscholtz, Tschernikh, and Vosnesensky. All of the later entomologists collected here as long as there was opportunity to do so.

New Helvetia[2] was the name given to a settlement established at the present site of the City of Sacramento in 1839 by Capt.

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[1] See account in Bull. Calif. Hist. Soc.

[2] Nueva Helvecia or New Switzerland, so named from his native home. Upham, S. C., Scenes in El Dorado in the years 1849-50, (Philadelphia, 1878), pp. 555-562.

John Sutter,[3] who although a newcomer, became a Mexican citizen and official in 1840 and obtained a large tract of land from the Mexican Government in 1841. This grant consisted of eleven square leagues[4] and extended sixty miles north to the "Buttes." In 1841, Sutter built a fort 500 by 155 feet, with adobe walls eighteen feet high and three feet thick. In it were used some of the lumber, windows, and doors taken from Fort Ross. The structure was completed in 1844. A reproduction of the original fort with an historical museum in Fort Sutter Park is now one of the attractive places in Sacramento. The present site was purchased for $20,000 in 1888 with money raised by the Native Sons of the Golden West. In 1891 the State Legislature appropriated $20,000 and later $15,000 to restore the Fort. The work of restoration was begun September 21, 1891, and completed April 26, 1893. Many of the old adobe bricks made originally by the Indians were used in the walls.

Sutter's Fort was armed with forty-one cannon purchased from the Russians along with Fort Ross. Here was maintained, not only a base for military operations which eventually wrested California from Mexico, but a most important trading center and a rendezvous of incoming settlers from across the plains. Some of the noted arrivals and visitors to Fort Sutter during this early period were: 1841, first immigrant train; 1840-41, I. G. Vosnesensky, Russian naturalist from the St. Petersburg Academy of Natural Sciences; 1841, Captain Ringgold of the Wilkes Expedition; 1842, Commodore Thomas Catesby Jones who raised the American flag at Monterey; 1844, General John C. Fremont with his guide Kit Carson, on March 6, and the Stevens-Townsend-Murphy party which brought the first wagons into California from across the plains; 1845, James W. Marshall, discoverer of gold; 1846, the largest immigrant party. Some of the Donner party were among these last.[5]

Although hundreds and thousands passed through this early settlement there are few who have left its memory in the great

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[3] For a short, terse biography of Sutter see Thomas C. Russell's Life in California by Alfred Robinson (San Francisco, 1925), pp. 314-315; Revere, J. W., A tour of duty in California (New York, 1849), pp. 72-75; Schoonover, T. J., The life and times of Gen. John A. Sutter, (Sacramento, 1907), portrait of Sutter, 312 pp; Bidwell, John, Life in California before the Gold Discovery, Century Mag. vol. 41, pp. 166-169 (1890).

[4] A league is a variable measurement and equals from 2.42 to 4.6 English statute miles. A marine league is three geographic miles.

[5] Bidwell, J. C., Life in California before the Gold Discovery, Century Magazine, vol. 41, pp. 166-169, (1890).

museums of the world. I. G. Vosnesensky collected Coleoptera at New Helvetia in 1840-41 which was described by C. G. Mannerheim, and this original locality still appears in the most recent catalog of American Coleoptera,[6] much to the confusion of modern workers. In Cendaras'[7] story Sutter is pictured in one place as "reading a pamphlet on the best method of breeding silkworms" in 1855, and as having had a collection of butterflies which was destroyed along with all of his property by the squatters, following a court decision restoring his vast domains. Both of these references are most likely pure fiction, but it seems evident that a number of mountain insects like *Ctenucha rubroscapus* Menetries were obtained at New Helvetia from parties who collected them in the Sierra. P. J. M. Lorquin collected here at various times during the period from 1850 to 1859. Dr. H. H. Behr, George W. Dunn, Henry Edwards, James Behrens, Tryon Reakirt, J. G. Cooper, R. H. Stretch, W. G. W. Harford, G. R. Crotch, Thomas L. Casey, and many other famous collectors and entomologists, procured specimens there or in other parts of the Sacramento Valley before agriculture became so dominant in that great region.

Fort Tejon[8] was built in 1852 and established as a military post to protect immigrants from Mexican bandits and renegade Indians, and was of considerable importance until it was abandoned in June, 1861. "The site of the old fort is a grassy bowl-shaped valley in the heart of the hills. Little remains of the fort itself save some remnants of adobe walls and one fairly complete building of the former barracks. A bronze tablet, erected by the Bakersfield Chapter of the Daughters of the American Revolution was unveiled November 10, 1923."[9] The fort is located in Tejon Pass below Lebec, at about 3200 feet altitude. The present Tejon Pass should not be confused with the Tejon Pass described by Lt. R. S. Williamson in his explorations in

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[6] Leng, C. W., Catalogue of Coleoptera, (N. Y., Sherman, 1920), 470 pp.

[7] Cendaras, Blaise, Sutter's Gold, translated from the French by Henry Logan Stuart, N. Y. and London, Harper Bros., 1826. (Little truth and much fiction are well mingled.)

[8] Grinnell, Joseph. Old Fort Tejon, Condor, vol. 7, pp. 9-13 (1905); Newmark, Harris, Sixty Years in Southern California, 1853-1913. (N. Y., Knickerbocker Press, 1916), pp. 46, 194, 195, 204, 207, 222, 234, 248, 297, 317, 327, 333; Rider, Fremont, Riders California, a guide-book for Travelers. (N. Y., Macmillan Co., 1925), pp. 564-565.

[9] Rider, Fremont. Rider's California, A guide-book for Travelers N. Y., 1925, p. 565.

1853,[10] which lies about 15 miles farther east.[11] In the reports of Williamson the present Tejon Pass was designated as "La Canada de las Uvas" (Valley of the Grapes). It was about 35 miles from Bakersfield and 150 miles from Los Angeles. Here at Fort Tejon were stationed cavalry troops which were chiefly used for fighting Indians and many were the demands upon the garrison there for this purpose. It was finally broken up in June 1861, and the army property and baggage was moved to Los Angeles by Lt. Beale on thirty or more camels.

Fort Tejon was an early collecting ground of a number of leading American coleopterists and is, therefore, a type locality for many species. John Xantus de Vesey,[12] the Hungarian zoologist and botanist, collected there in 1857-8. His specimens were described later by Dr. J. L. LeConte,[13] who also collected there in 1850. Dr. George H. Horn,[14] during his connection with the army post there, collected a large number of beetles sometime between 1863 and 1867.

Camp Independence was established on Oak Creek, Inyo County, California, by Col. Evans on July 4, 1862, where troops were maintained during the Indian wars. The buildings were levelled by the earthquake of 1872[15] and new barracks immediately rebuilt. It was garrisoned continually from 1865 to 1877 when it was abandoned. The city of Independence gradually grew up and finally replaced the military camp. This camp was made a famous collecting ground by the eminent coleopterist George H. Horn, in 1863.

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[10] Reports of explorations and surveys for a route for a railroad from Mississippi River to the Pacific Ocean. 33d Congress, Senate Ex. Doc. No. 78, vol. 5, for years 1853-1854, p. 39 (1856); Albright, G. L., Official explorations for Pacific Railroads, 1853-1855. Univ. of Calif. Press, pp. 137-138 (1921).

[11] Since the preparation of this paper an article by J. C. Davis, "A List of the Coleoptera of Fort Tejon, California, appeared in the Bulletin of the Southern California Academy of Sciences, vol. 31, Sept.-Dec. 1932, pt. 3, pp. 75-87.

[12] Essig, E. O., A History of Entomology, Macmillan Co., New York, pp. 804-808, 1931.

[13] Essig, E. O., *Ibid*, pp. 680-685.

[14] Essig, E. O., *Ibid*, pp. 654-658

[15] "A contemporary newspaper account of the earthquake destruction at the fort states that 'all the buildings (adobe) are partially destroyed, though but few were thrown down.' The camp was reconstructed with frame buildings." W. A. Chalfont in a letter to the writer under date of February 12, 1927, from Bishop, Calif.

INSECT COLLECTING IN CALIFORNIA

BY E. G. LINSLEY AND R. L. USINGER

Oakland, California

The State of California has long been a paradise for insect hunters and has received a great deal of attention from both amateur and professional collectors during the last quarter of a century. In common with most localities it is not yet thoroughly collected so the worker is forever spurred on in his never-ending quest for interesting things. Even the most remote localities are now easily accessible and students of insect life have found favorable field conditions through almost the entire year. Entomologists who are unfamiliar with the topography of the second largest state in the Union are sometimes led into error by associating localities which may be 800 miles apart, may differ 14,000 feet in elevation, or which may be a part of the Sonoran Desert of northern Mexico or a portion of the Canadian and Alpine faunas to the north. In the present series of articles, the authors wish to take the reader on a number of short collecting trips to various well-known places which are characteristic of certain ecological habitats or faunal areas. Thus we will visit the beach at the ocean's edge, the dry foothill regions, the cold, high-altitude, Alpine areas, the broad central valleys, and the deserts to the south. In each locality an attempt will be made to give the general features of the topography, the climate, the flora, and the representative insects found there. It is hoped that the authors will be forgiven for laying stress on the Coleoptera and Hemiptera but, aside from the fact that these are the orders with which they are most familiar, these groups, along with the Lepidoptera, have been studied more extensively than any others in the west. Appreciation is expressed to Dr. E. C. Van Dyke and Prof. E. O. Essig for kindly reading the manuscript and offering many valuable suggestions.

MARIN COUNTY

On a promising day in April we arise early in anticipation of a day spent in the field. Since the season is sufficiently advanced for the blooming of the mountain lilac, *Ceanothus*, we leave home for a favorite collecting spot, Marin County. We cross San Francisco's Golden Gate by ferry and arrive at Sausalito, on the tip of the Marin Peninsula. Here we entrain for Mill Valley and soon reach our destination.

Mill Valley is at the foot of Mt. Tamalpais, popularly known as "The Sleeping Lady", which rises to a height of 2520 feet. To the west we see the dense green of the redwood forest of Muir Woods. This is a National Monument and is the most accessible grove of sequoias in California. It is typical of the entire coastal redwood belt. To the east, but out of sight, lies San Francisco Bay. We are now at approximately the center of Marin County, in the Coastal Transition Life Zone of California.

Impatient to be off we turn our steps toward Muir Woods. Upon entering the gloom of the redwood forest, our beating sheets produce little of insect life. A few examples of the small cupressophilous coccinellid, *Hyperaspis lateralis*, which is feeding upon mealy bugs, *Pseudococcus sequoiæ*, and an inoffensive and bedraggled-looking crane fly, are our scanty reward. However, at our feet are seen the peculiar nest-like turrets of a *Lycosa* spider which are constructed from the dead sequoia needles. Approaching a cleared area fortune favors us as we come upon some recently cut logs. It is the work of but a moment to capture an ovipositing female of the metallic blue wood wasp, *Sirex areolatus*, one of the few insects capable of living in the heart-wood of sequoias. A sharp blade applied industriously to the bark reveals the incompleted galleries of the redwood bark beetle, *Phlœosinus sequoiæ*. Rolling over a log several small, pale apterygota are exposed in the leaf-mold below. These prove to be *Campodea essigi*, *C. californiensis*, and *Neomachilus halophilus*. A chestnut-brown milliped, *Julus hesperus*, curls up when disturbed, emitting a noxious fluid, while the usual group of sow bugs, *Porcellio lævis*, seek cover. Across the clearing a circle of young redwoods indicates the remains of a former monarch which has succumbed to the ravages of time. Tearing apart the rotten sap-wood a colony of the redwood stag beetle, *Cerachus striatus*, is discovered along with the giant carabid *Pterostichus ater*. A sudden buzz, a lunge, and one of us captures a fine example of the longicorn, *Anoplodera mathewsi*, a species confined to the cupressine trees. The day shows promise of being a successful one!

Emerging from the redwoods, we enter the oak-madrone forest on the lower slopes of Mt. Tamalpais. In the trees above us, a persistent clicking reveals the presence of the little black

cicada, *Platypedia minor*. The foliage of *Quercus agrifolia* yields a number of soft-bodied green and brown phasmids, the primitive *Timema californica* of Scudder, several square, brownish chrysomelids, *Syneta simplex*, and the grotesque, typically western neuropteron, *Raphidia oblita*. Clinging to the sheet beneath the leaves and other debris, the metallic blue-green weevil, *Deporaus glastinus*, and a slightly dazed green lacewing, *Chrysopa californica*, are discovered. Wind-broken branches give up the vari-colored bostrichid, *Psoa quadrisignata*, while on the longer-dead, inner branches the cocoon-forming anobiid, *Hedobia granosa*, the wingless, ant-like clerid, *Cymatodera ovipennis*, and a squat, hairy, lichen-colored longicorn, *Pogonocherus crinitus*, are found. Amid the rubbish of the beating sheet an obscure, mycetophagous flat bug, *Aradus fuscomaculatus*, is concealed. Disturbed by the beating of a catocala, *Catocala californica*, is netted as it forsakes the protective background of an oak trunk.

Moving onward up the trail our attention is arrested by a scurrying red-bordered pyrrhocorid which proves to be the not uncommon *Euryophthalmus cinctus californicus*. On an elderberry bush we find the rare *Desmocerus californicus* which, in spite of its bright-colored clothing, is not easily distinguished from its surroundings. This species is confined to the blue-berried elder whereas its relative, *D. cribripennis*, occurs on the red-berried elder nearer the coast. The turning of a stone disturbs the wingless, nocturnal cicindelid, *Omus californicus*, and a few sleepy camel crickets, *Gammarotettix californianus*. Encouraged, we uncover in quick succession the formidable sand cricket, *Stenopelmatus*, the ever-present *Pterostichus californicus*, and a late specimen of the shiny black carabid, *Promecognathus lævissimus*. The latter is a relic of the past with its only close living relative in South Africa. After interrupting the helicoid meal of a snail-eater, *Scaphinotus striatopunctatus*, we continue toward the chapparal slopes above.

The chapparal formation consists of *Ceanothus*, *Baccharis*, Manzanita, Chamise, and related shrubby plants. Here we find some of our best collecting! A pale swallow-tail, *Papilio eurymedon*, flutters lazily past indicating the proximity of the golden-leafed oak, *Quercus chrysolepis*. As our beating sticks descend upon the *Ceanothus*, numerous insects fall amid a shower of

blossoms upon our sheet. We hastily capture the highly-colored *Callimus ruficollis* and *C. cyanipennis*, a fine specimen of *Dicerca horni*, and a score of small lace-bugs, *Corythucha maculata* and *C. distincta* which are patiently flicked into our bottles. However, a discordant note is struck as we observe several ticks, *Dermacentor occidentalis*, crawling upon our clothing. This situation is quickly remedied and we turn our attention to the red-barked manzanita, *Arctostaphylos*. Patient beating discloses several small plant bugs, *Phytocoris cuneatus*, the rare cerambycid, *Neoclytus interruptus*, and numerous tumbling black scarabs, *Serica anthracina*. The chapparal broom, *Baccharis*, yields the common and characteristic plant bug, *Lygus sallei*, several wierd little treehoppers, *Philya californiensis*, and a single example of the much sought after *Chrysobothris bacchari* of Van Dyke. On the tips of the shoots are seen the globular, green and red, dipterous galls, *Rhopalomyia baccharis*, and the more flattened and elongated swellings of *R. californica*.

A field of grass and flowers induces us to exchange our beating sheets for sweeping nets. Here, for the first time, we collect a few of the small black grass bugs, *Irbisia californica*, *I. mollipes*, *I. sita*, and *I. solani*, which have been teeming about our feet. Sweeping a clump of buttercups, *Ranunculus californicus*, we net the slender brown elater, *Agriotes imperfectus*, a number of small negro bugs, *Corimelaena anthracina*, and several andrenid bees, *Andrena lustrans*. In addition, the ever-present *Anthaxia æneogaster* is very abundant on the California poppy, *Escholtzia*, as is the pollen-feeding nitidulid, *Amartus tinctus*. In company with these we take the hairy march fly, *Bibio hirtus*, the greenish-black *Leptacmæops spuria*, and several blister beetles, *Lytta stygica*. An occasional specimen of a small lycænid, *Plebejus behri*, is seen. The umbelliferous yarrow milfoil harbors *Trichodes ornatus*, the larvæ of which are parasitic in the nests of bees, several *Mordellistena*, and *Acmæops tumida*. Also numerous small predaceous bugs, *Triphleps tristicolor*, are feeding upon the thrips, *Frankliniella minuta*.

Continuing our ascent, we reach the summit of Mt. Tamalpais where we partake of our noonday repast. In the grass about us an occasional brown lubber grasshopper, *Agymnastus ingens*, is discovered which so closely resembles its surroundings as to almost defy detection.

Our leisurely return down the mountain in the afternoon is interrupted by the periodic "cheeping" of the fork-tailed katydid, *Scudderia furcata*. Resuming our beating, toyon berry, *Photinia arbutifolia*, showers our nets with more lace-bugs, *Corythucha heteromelecola*, and the cumbersome *Dascillus davidsoni*. A spray of wild rose produces the red and black weevil, *Rhynchites bicolor*, and from a branch of poison oak, *Rhus diversiloba*, a short-winged cerambycid, *Molorchus longicollis*, and a fulvous flea beetle, *Leptotrix recticollis*, are gingerly rescued.

Attracted by the sound of wood-cutting, we leave the trail and are delighted to find some recently cut madrone, *Arbutus menziesii*, and live oak, *Quercus agrifolia*. On the madrone the wasp-like *Neoclytus conjunctus* and its beautiful red and blue predator, *Chariessa elegans*, are found along with a single example of the very rare *Clytus blaisdelli*. *Xylotrechus nauticus* swarms upon the oak logs with the lead cable borer, *Scobicia declivis*. Beneath these logs a colony of the subterranean termite, *Reticulitermes hesperus*, is discovered.

In a nearby ravine along a small stream Grinnell's dusky-wing, *Erynnis persius pernigra*, and the umber skipper, *Poanes melane*, are found. On the water the usual water striders, *Gerris remigis*, skate about while below the surface dytiscid beetles, *Agabus sp.*, and the black shining hydrophilid, *Tropisternus californicus*, are swimming in company with some back swimmers, *Notonecta insulata*, and water boatmen, *Arctocorixa sp.*

Along the bank of the stream some mint calls again for our sweeping nets. In the slanting rays of the sun a fine series of striking pentatomids, *Cosmopepla conspicillaris*, *C. uhleri*, and *Eysarcoris intergressus*, is taken.

With this we bring our collecting day to an end and turn our steps toward the Mill Valley station satisfied that Marin County has once again provided us with a fruitful day in the field.

NOTES AND DESCRIPTIONS OF SOME CERAMBYCIDÆ FROM THE TRES MARIAS ISLANDS

BY E. GORTON LINSLEY

Oakland, California

The Tres Marias are a group of islands seventy-five or eighty miles off the coast of Mexico, below the entrance to the Gulf of California. In May, 1925, an expedition of the California Academy of Sciences visited these islands and among the Cerambycidæ taken at that time, the following seem noteworthy:

Smodicum pacificum Linsley, new species

Elongate, flat, parallel, pale testaceous, shining, sparsely clothed with suberect, yellowish hairs. Head closely, moderately finely punctured, wider than prothorax (♂), narrower than prothorax (♀); antennæ rather stout, sparsely ciliate, extending a little past the middle of the elytra (♂), nearly to middle of elytra (♀); segments three to eleven subequal in length but decreasing gradually in diameter toward apex. Prothorax as long as broad (♂), feebly transverse (♀), widest at basal third and gradually narrowed anteriorly (♂), hexagonal and widest at middle (♀); disk strongly flattened, moderately finely and not closely punctured; prosternum strongly depressed at sides (♂), uniform throughout (♀). Elytra three times as long as broad, less finely and more closely punctured than prothorax; apex a little dilated; apices separately rounded. Ventral surface shining, finely, sparsely punctured; fifth ventral abdominal segment transverse, shorter than fourth (♂), rounded at apex and longer than fourth (♀). Legs short; femora strongly clavate; tibiæ and tarsi together scarcely longer than femora. Length 6-8 mm.; breadth 1.3—2 mm.

Holotype male (No. 3884), allotype female (No. 3885, C.A.S. Ent.) and seven paratypes taken on Magdalena Island, Tres Marias, May 19-20, 1925, by Mr. H. H. Keifer. One pair of paratypes remain in the collection of the writer, the remainder in the collection of the California Academy of Sciences.

This species is related to *S. parandroides* Bates with which it agrees in having the head rather suddenly and obliquely narrowed behind the eyes. It may be easily distinguished from that species, however, by the more even and scarcely sulcate vertex of the head, the prothorax widest at or behind the middle rather than at apex, and the finer, sparser punctation of the entire upper

surface. From *S. cucujiforme* Say, it differs in the shape and proportions of the prothorax, the strongly and obliquely narrowed head behind the eyes, and the finer, sparser punctation of the head, prothorax, and elytra.

Eburia stigmatica Chevrolat

One male, captured on Magdalena Island, Tres Marias, May 19, 1925, by Mr. Keifer. Although typical *E. stigmatica* has a long spine at both the sutural and outer apical angles of the elytra, the above example has the sutural spine much reduced and the outer spine absent, the angle being merely dentiform. In spite of this difference and a distinct reddish cast to the specimen, it seems best referable to this species.

Eustromula keiferi Linsley, new species

Stout, rufo-piceous, densely clothed with recumbent, yellowish pubescence. Head coarsely, rugosely punctured; antennæ attaining the middle of the elytra (♀), densely pubescent, sparsely ciliate, segments three to six with a short spine at the apex, segments five to seven excavated beneath. Prothorax transverse, very coarsely and irregularly punctured; disk with three polished, triangularly arranged, tubercles. Scutellum densely pubescent. Elytra slightly more than twice as long as broad, densely clothed with suberect, yellowish pubescence which is intermixed with conspicuously longer hairs toward apex; apices truncate with the inner angle spiniform. Metasternum finely punctured at sides, very coarsely punctured at middle; abdomen clothed at sides with short, recumbent, yellowish pubescence intermixed with longer suberect hairs; fifth ventral segment rounded at apex (♀). Length 13 mm.; breadth 6.75 mm.

Holotype female (No. 3886, C.A.S. Ent.), Maria Madre Island, Tres Marias, May 21, 1925, H. H. Keifer.

E. keiferi agrees with *E. validum* LeConte in those characters of generic importance but differs markedly in the long, dense pubescence covering the entire body. It may be further differentiated by the more transverse prothorax and very coarsely punctured metasternum.

Elaphidion irroratum Linn.

Four specimens taken at Maria Madre, Tres Marias, May 17-21, 1925, by Mr. Keifer. In one of the examples the white pubescence covers nearly the entire upper surface.

ANOPLIUM RETICOLLE Bates

Four examples of this obscure little species were captured at Maria Madre, Tres Marias, May 15-21, 1925, by Mr. Keifer. Originally described as a *Peribœum*, the species seems equally ill-placed in *Anoplium*. Eventually it will probably form the basis of a new genus along with *A. bimaculatum* Bates and several other species characterized by the peculiar alveolate sculpture of the prothorax.

IRONEUS PULCHER Bates

A single specimen of *I. pulcher* was taken on Magdalena Island, Tres Marias, May 20, 1925, by Mr. Keifer. This is apparently the first Mexican record for this species. It was described from Chontales, Nicaragua.

CLEOZONA RUFIPES Bates

One example, Maria Madre, Tres Marias, May 21, 1925, collected by Mr. Keifer. This appears to be a valid species and not a variety as placed by Bates. It differs in the larger size, the more slender form, the rather widely separated eburneous elytral fasciæ, the broader red belt of the elytra, and in having all of the legs red, clothed with recumbent, white pubescence.

LAGOCHEIRUS OBSOLETUS Thomson

Two specimens, Maria Madre, Tres Marias, May 21, 1925, H. H. Keifer.

Leptostylus plumeoventris Linsley, new species

Short, slightly convex, reddish-brown, clothed with white, brown, and yellowish pubescence. Head rather densely clothed with short, recumbent, white and brownish pubescence; antennæ slender, densely pubescent, mottled with brown and white, segments annulated at apex. Prothorax transverse, disk tuberculate, coarsely punctured; pubescence condensed into irregular patches of yellowish and whitish scale-like hairs; sides behind the middle armed with an obtuse lateral tubercle. Elytra about twice as long as broad, coarsely but not closely punctured; pubescence moderately dense, with two rather well defined longitudinal yellow vittæ and an acute white band extending from suture at middle to lateral margin at apical one-fourth; surface with scattered tufts of suberect setæ, apices separately rounded. Femora densely clothed with brown and white pubescence; tibiæ white, annulated with brown;

first segment of posterior tarsus shorter than second and third together. Ventral surface densely, irregularly clothed at sides with white pubescence, giving a flaky, mottled appearance; punctation very fine, close. Length 8 mm.; breadth 3.5 mm.

Holotype male (?), (No. 3887, C.A.S. Ent.), captured at Maria Madre, Tres Marias, by Mr. Keifer.

L. plumeoventris is closely allied to *L. falli* Linsley from Arizona, but differs from that species in the shorter, more obtuse, lateral prothoracic tubercles, the more abundant tufts of suberect setæ on the elytra (particularly at the sides), and in the peculiar, flake-like arrangement of the pubescence on the ventral surface.

Note Regarding the Secondary Sexual Characters in Phlœodes (Coleoptera, Tenebrionidæ)

In the males of the species of Phlœodes Lec. on the under surface of the femora, at middle, there is an oval, flat, tumid area, clothed with golden pubescence, surrounded by a smooth raised margin. Apparently this secondary sexual character has been entirely overlooked. Le Conte (Proc. Acad. Nat. Sci. Phila., 1859, p. 77) does not mention it; Casey (Can. Ent., Vol. XXXIX, 1907, p. 42) has overlooked it and Horn (Revision of the Tenebrionidæ) likewise did not observe this important character.—F. E. Blaisdell, Sr.

Note Concerning Apsena barbaræ Blaisdell (Coleoptera: Tenebrionidæ.)

In the Trans. of the Amer. Ent. Soc., vol. LVIII, p. 61, I described *Apsena barbaræ*, giving as one of the differential specific characters the short even elytral pubescence, as compared with that of *Apsena pubescens* Lec. which has the elytral hairs longer and irregular in length. *Barbaræ* is most often found in ants' nests. In my Monographic Revision I remarked that perhaps the ants had "bobbed" the pubescence, as most of the specimens observed with ants have the hairs short and even. Since writing my paper I have reared numerous specimens and all emerged with pubescence as in *pubescens* Lec. This does not, however, invalidate the species, as *barbaræ* is distinctly more robust and when matured the head and pronotum is piceous to dark nigro-piceous. In *pubescens* Lec. the form is more elongate and the head and pronotum are rufous to a varying degree.—Frank E. Blaisdell, Sr.

THE PROSTHECA OR MANDIBULAR APPENDAGE

BY RICHARD E. BLACKWELDER

Stanford University, California

In 1826 Kirby and Spence[1] recorded the existence on the mandibles of certain Staphylinid beetles of a membranous appendage which they named the prostheca. Since that time there have been references to similar organs in many insects,[2] and the term prostheca has been applied to various structures without any proof of their homology. It is not intended in the present paper to attempt to homologize any of these structures with the prostheca, or to try to cite all the references to them, but rather its purpose is to fix definitely the meaning of the word "prostheca" as originally proposed.

Kirby and Spence describe the prostheca as follows:

"Under this head I must not pass without notice an appendage of the mandibles, to be found in some of the rove-beetles (Staphylinidæ), as in *Ocypus, Staphylinus,* and *Creophilus* Kirby. In the first of these it is a curved, narrow, white, subdiaphanous, submembranous, or rather cartilaginous piece, proceeding from the upper side of the base of the mandible; in the second it is broader, straighter, and fringed internally and at the end with hairs; and in this at first it wears the appearance of being attached laterally to the mandible under the tooth, but if closely examined, you will find it is separate; in *Creophilus maxillosus* it is broader. This is the part I have named *prostheca.* It is perhaps useful in preventing food from working out upwards during mastication."

The American representative of *Ocypus* [*O. ater* (Grav.)] has a mandible differing considerably from the figure given by the above writers but very similar to that actually found in *Creophilus.* Their figure of the mandible of *Ocypus* is so simple and indefinite that it seems most likely that the structure which was depicted by them is the true homologue of the one found in *Creophilus* as stated above. They do not give a figure of the prostheca of *Creophilus* but refer to one given by Olivier in 1795.[3] This figure is also rather indefinite as to the details,

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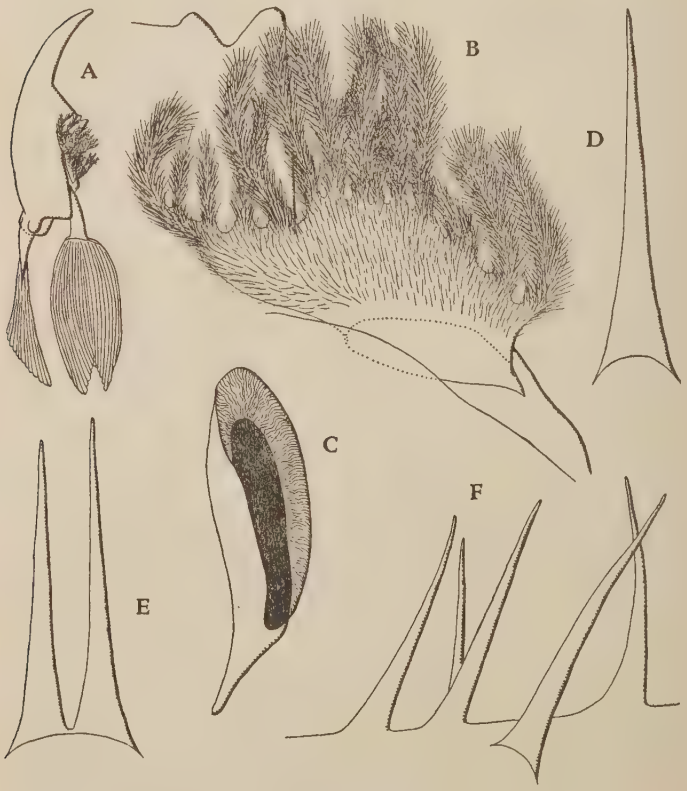
[1] An Introduction to Entomology, Vol. III, pp. 438-439, XIII, fig. 7 c". (1826).

[2] For example: *Lacinia mobilis* in many beetle larvæ (Böving); *pharyngeal bracon* in Rhynchophora (Hopkins); *prostheca* in *Passalus*; *lacinia* in *Campodea* (Meinert); *second mandibular joint* in Trichopterygidæ (Wood-Mason); *inner lobe* of Scarabæoidea (Packard); *lacinia-lake process* of Ephemerid nymphs (Heymons); etc.

[3] Entomologie, Coleopteres, Tom. III, Pl. I, fig. 1 b. (1795).

but represents a mandible very similar to that of *Creophilus villosus* (Grav.), which is the American representative of this genus. A hairy inner lobe is indicated and is evidently the structure referred to by Kirby and Spence.



EXPLANATION OF FIGURE

Figure 1. Prostheca of *Creophilus villosus* (Grav.). A, ventral aspect of right mandible, showing position of prostheca and muscles; B, prostheca projecting from its foramen; C, prosthecal foramen from the side (the foramen at the base of a declivity); D, E, F, spine-like processes of the prostheca and its lobes.

Figure 1 gives the details of structure and position of the prostheca of *Creophilus villosus* (Grav.). It is situated on the inner face of the mandible (A) just below the tooth. This face is somewhat concave and rather membranous, forming a short longitudinal groove. At about the middle of this groove is an ovate depression with an opening into the interior of the mandible (A, B, and C). From this foramen projects a membranous lobe or prostheca (A and B). The prostheca extends cephalad and mesad of the foramen, branching into numerous lobes, and closely beset with fine hairs or processes. As the term hair is generally understood to be synonymous in its morphological sense with the term seta, the present structures are best called processes, as they are not set in sockets of the cuticula but are merely finely pointed extensions of the body wall (D, E, and F.) No muscles have been observed on the prostheca in this study, and the mobility of the organ is due entirely to its soft membranous character, rather than to any segmentation or articulation.

The prostheca present in *Staphylinus* and many other Staphylinids is very similar to that described above. Differences seem to be chiefly in form and size, rather than in position on the mandible.

The prostheca as found in these representatives of the subfamily Staphylininæ may be taken as the type example of this structure. Attempts to homologize similar structures with this may well result in valuable conclusions to the study both of morphology and of classification. It is hoped that such attempts will be made easier and more productive by this record of the structure to which the name prostheca was originally applied.

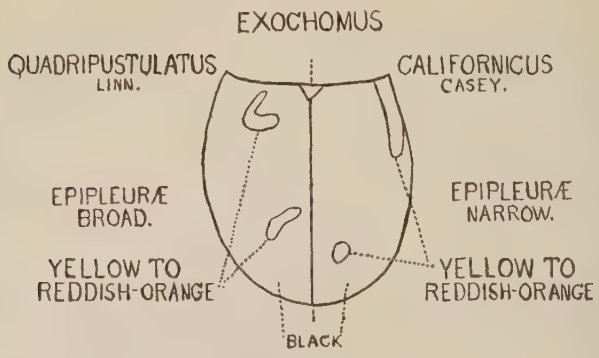
STUDIES AMONG THE COCCINELLIDÆ, No. 7

(Coleoptera)

BY F. W. NUNENMACHER

Piedmont, California

Some years ago the State of California imported from Europe a number of Coccinellidæ, among them the *Exochomus quadripustulatus* Linn. This species has spread to many parts of the state. It has been taken by several students and labelled *E. californicus* Casey. I have made a crude drawing which should



enable one to separate these species at a glance. *E californicus* already has had some juggling. Dr. J. Weise first called it a variety but after I had sent him a few specimens he stated that it was a valid species.

Brumus blumi Nunenmacher, n. sp.

Color black throughout, polished above, under surface and legs opaque, tibiæ and tarsi fuscous.

Form oval, not strongly convex. Head finely and thickly punctured. Pronotum and elytra very faintly punctured, the punctures hardly visible with a low power lens. Length 2.25 to 3.25 mm., width 1.25 to 2.25 mm.

Holotype, male, allotype, female, and eight paratypes in my collection. Paratypes also in the collections of J. E. Blume and Willard Nutting.

Type locality: Moraga, Contra Costa County, California.

This species can readily be separated from *B. æthiops* Bland, or its variety *mormonicus* Casey by its smaller size, oval form and in being less strongly convex. The only difference I found in some 80 specimens examined was in the size. I dedicate this species to its discoverer, John E. Blum, who, with Willard Nutting, took it in large numbers.

THE SUBSPECIES OF CHLÆNIUS LEUCOSCELIS CHEV. (COLEOP., CARABIDÆ) WITH A NOTE ON A FUNCTION OF MUSEUMS

BY P. J. DARLINGTON, JR.

Museum of Comparative Zoölogy, Cambridge, Mass.

Mr. H. C. Fall, prompted by an inquiry from Mr. Hugh B. Leech, has recently called my attention to the fact that all his western specimens of *Chlænius leucoscelis* Chev. agree with Chaudoir's (1876) and Horn's (1876) tabular characters (profemur of ♂ angulate below near base, and ventral segments smooth at middle) but that his eastern ♂♂ have the front femur not angulate and all his eastern specimens have the abdomen sparsely punctate at middle. Upon consulting the literature I find that *leucoscelis* was originally described by Chevrolat from Vera Cruz, southern Mexico. The form of the ♂ profemur is not mentioned. The Museum of Comparative Zoölogy possesses a series of 11 specimens (9♂, 2♀) from Oaxaca, southern Mexico, and 1 (♂) from Guatemala City, Guatemala, which are apparently typical of the species. The ♂ profemur is rather strongly angulate and the abdomen is smooth at middle. Also in the M. C. Z. are specimens from California (♂♂♀), Arizona (9♂, 7♀; including the unique ♂ type of *Chlænius monachus* Lec.), Texas (3♂, 3♀), and Chihuahua, northern Mexico (4♂) which resemble the Oaxaca specimens closely except that the ♂ profemur, while still distinctly angulate, is a little less strongly so. The M. C. Z. specimens from Spokane Falls, Washington (3♂, ♀) and vicinity of Durango, Colorado (9♂, 2♀) are also closely similar to typical *leucoscelis*, but the ♂ profemur nearly or quite lacks the basal angulation. Two specimens from Roseburg, Oregon and one from St. George, Utah are unfortunately all ♀♀, but agree with other western specimens in asexual characters.

The museum's material from the East, which answers the description of *Chlænius cordicollis* Kby. (described from Canada) includes specimens from Quebec (♂♀), Vermont (3♀), Massachusetts (7♂, 4♀), New York (♂♀), Pennsylvania (7♂, 6♀), Virginia (♂), Ohio (2♂, 3♀), Illinois (2♀), and Lake Superior (♂). The eastern ♂♂ nearly or quite lack the angulation of the profemur just as Colorado and Washington

specimens do. In other characters, however, the western and eastern series are readily distinguishable, as follows:

Western Specimens	*Eastern Specimens*
Specimens average slightly smaller and more slender.	Color usually greenish or grayish, rarely bright blue.
Color bluer, less commonly greenish or grayish.	Regions specified distinctly rugose or punctate.
Prothorax usually more cordate, with sides more sinuate before base.	Abdomen with sparse, fine punctuation at middle.
Head near base of eyes, and pronotum near sides anteriorly not distinctly punctate.	Profemur of ♂ not, or indistinctly angulate.
Abdomen smooth at middle.	
Profemur of ♂ variable (as described).	

The size and color differences are by no means constant, though noticeable in series. The differences in punctuation are well defined, however, in spite of a little individual variation.

Horn (1876) in dealing with the forms just discussed, lumps them under the name *leucoscelis* Chev. He did not notice differences in the ♂ profemur or in the punctuation of the abdomen, and minimized the value of other characters. Chaudoir (1876) also failed to notice femoral and abdominal differences, but separated the eastern and western forms as species on other characters. There can be no question that these two forms really are different. They should be listed either as species or as well defined geographical subspecies, the category depending entirely upon the custom or preference of the author. It seems to me best to consider them subspecies. I do not mean by this term, as some writers apparently do, that I doubt the distinctness or recognizability of the forms in question. I mean that I believe they are recognizably differentiated *geographical* forms of a single widely distributed original population, and that their relationship is most naturally and conveniently shown by the use of trinomials, as similar relationships are shown in the present classification of most vertebrates and many invertebrates. I regard the slight geographical differences in form of the ♂ profemur as not sufficient to justify the division of *Chlænius leucoscelis* into additional western subspecies at present. The following, then, seems to be the most satisfactory classification of the species: *C. leu-*

coscelis leucoscelis Chev.[1] 1834, Col. Mexique, Cent., I, 4, nr. 23. Chd. 1876, Ann. Mus. Civ. Genova, 8, 190; Horn 1876, Trans. Am. Ent. Soc., 5, 266; Casey 1914, Memoirs, 5, 35.

monachus Lec. 1851, Ann. Lyc. N. H. New York, 5, 180.

Range: southern Mexico and Guatemala to Washington, Colorado, Utah, and Texas.

C. leucoscelis cordicollis Kby. 1837, Fauna Boreali-Americana 4, 22; Chd. 1876, *l. c.*, 188.

Range: eastern Canada to Lake Superior and Virginia.

This brief study of *Chlænius leucoscelis* emphasizes a function of public museums which many entomologists fail to appreciate —the accumulation of large series of specimens. I have heard it insinuated that large museums, by acquiring one relatively small collection after another, are not much better than dogs in mangers; that most of the specimens they take in are merely duplicates which they dispose of at the first opportunity, and which other institutions could use to better purpose. This is really very far from the truth. It is true that many *species* are duplicated in nearly every private collection of beetles which this museum receives, but the *localities* from which the specimens come are comparatively rarely duplicated. To give examples from the present paper, all our Oaxaca and Guatemala specimens of *C. leucoscelis* are from a duplicate collection of *Biologia* material received from Salvin and Godman; all our California specimens are in the Leconte Collection; all the Washington specimens, from Bowditch and Hayward; those from Chihuahua, from Bowditch; the interesting series from Colorado, from Bowditch, Hayward, and Bolster; all specimens from Ohio, from Gehring, those from Quebec, from Blanchard; etc. Taken as a whole, the museum's collection of *leucoscelis* (99 specimens with more or less definite locality labels, as well as 27 unlabeled) is from localities surprisingly well distributed over the known range of the species, and shows geographical variation as none of the single collections which we have received could possibly do. Very few private collectors can afford to accumulate series of scores or hundreds of specimens of each species. It therefore

[1] This bibliography includes only references of real taxonomic importance; references to records of capture, habits, etc. are omitted. The synonymy of typical *leucoscelis* should probably include *Chlænius gilensis* Csy. (1914, p. 35) and *C. sanantonialis* Csy. (1914, p. 36). However, I have not yet had the opportunity of examining Casey's types.

becomes a function of the museum to do so, and to file the material away so that it will be available for reference at any time. I think that this function is no less important than the museum's more obvious duty of preserving types and other historical specimens from generation to generation. Both functions are necessary to make possible thorough and satisfactory taxonomic work.

Two Good Books

Dr. Imms[1] has now placed entomological students under renewed obligations by publishing a new revised edition of his Textbook of Entomology, the second edition of which appeared in 1929 and at once took its place as one of the leading textbooks on entomology. The present edition is a thorough and careful revision of the earlier work bringing it abreast of the science of entomology as it stands today. The author has avoided the extreme views of certain of our entomological systematists for which he is to be highly commended. We notice that he uses the name Hemiptera for the combined Heteroptera and Homoptera, a logical arrangement that will be appreciated by all whose studies cover both suborders. He includes the Mallophaga in the Anoplura and employs the familiar Odonata in place of the recently used Paraneuroptera. He has treated very fully the morphology of each of the 23 orders he recognizes, and under classification gives keys to the families of each of the orders. The 624 illustrations will be found a great aid to beginners and the 727 pages are crowded with information, concisely presented. The book will be found indispensible in the work of all general students of entomology.

The publication of Dr. Curran's manual of the Diptera[2] is another milestone in the history of American entomology. It is a profusely illustrated royal 8vo volume of 512 pages. In addition to interesting prefatory matter it includes keys to all taxonomic groups down to the genus. Dr. Curran does not recognize subgenera, such a unit to him being either a genus or a synonym. The work replaces Williston's Manual, now out of print and somewhat out of date. No student of the Diptera can afford to be without this volume.—E. P. Van Duzee.

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[1] Imms, A. D., A General Textbook of Entomology, 3d edn., N. Y., E. P. Dutton & Co., 1934

[2] Curran, C. H., The Families and Genera of the North American Diptera. N. Y., publ. by the Author, 1934.

TWO SPECIES OF MECOPTERA FROM ALASKA*

BY LOWELL C. LLOYD

As the only previous report of the occurrence of the genus *Boreus* from Alaska is that of *B. borealis* Banks from St. Paul Island in the Bering Sea, a note on the occurrence of two species on the mainland should be of interest. The following account is based on four specimens, one male and one female of a species described as new and closely related to *B. borealis* and two females of *B. unicolor* Hines. All were collected between Kennecott and McCarthy, Alaska, on the snow, April 15, 1934, by Mr. Wilbur Lloyd.

Boreus intermedius Lloyd, n. sp.

Male: Length of body 3.5 mm; body very dark brown, almost black; eyes brown; beak (except base), wings, legs including coxæ and pleura light yellowish brown; posterior margin of hypandrium entire; outer margin of wings abruptly curved, base sloping back medially.

Female: Length of body 4.5 mm; color as in male; ovipositor nearly twice length of beak; wing pads slightly lighter in color than body, reaching to middle of metanotum.

Holotype (male) and allotype (female): Between Kennecott and McCarthy, Alaska, April 15, 1934, on snow; both in collection of Washington State Museum, University of Washington, Seattle.

As will be apparent from the above description *B. intermedius* is very similar to *B. borealis*. The female agrees perfectly with descriptions of that species (Banks 1923; Carpenter 1931) while the male differs in the shape of the wings which approach the form found in *B. californicus*. The figure will make this readily apparent.

BOREUS UNICOLOR Hines

This species has been reported from Bozeman, Montana, and one female has been taken at Reno, Nevada (Carpenter 1931). The present specimens, both females, are uniformly an extremely dark brown or black in color, the wing pads being a little lighter.

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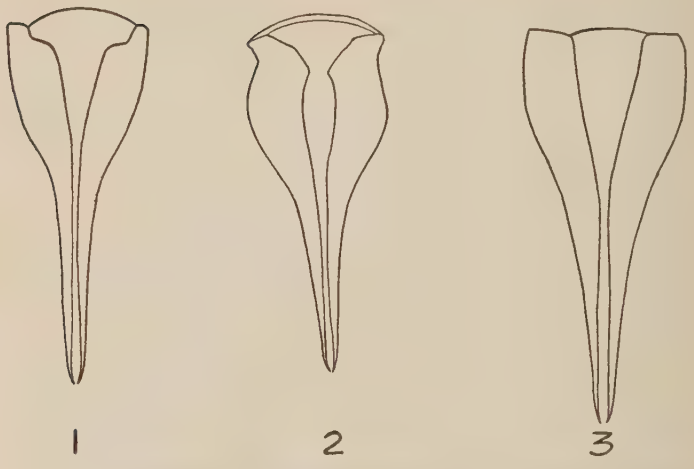
*Contribution from the Department of Zoology of the University of Washington.



1. *B. californicus;* 2. *B. intermedius;* 3. *B. borealis.* Figures 1 and 3 after Carpenter.

One is somewhat smaller than that given for *B. unicolor* but appears to be abnormally contracted, while the other specimen is a full 5 mm in length. The ovipositor is not quite twice as long as the beak but in all other respects the Alaskan specimens agree with published descriptions of the female of *B. unicolor* Hines.

Both specimens have been deposited in the Washington State Museum on the campus of the University of Washington, Seattle.

The author is indebted to Professor Trevor Kincaid and Dr. Melville H. Hatch for their kind assistance in the preparation of this paper.

REFERENCES CITED

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NEW SPECIES OF OROBANUS

BY EDITH W. MANK

Lawrence, Mass.

Up to the present time, the genus Orobanus has included three species, one of which, *O. simulator*, was described by LeConte in 1878 and the other two, *O. rufipes* and *O. densus*, by Casey in 1886. The first is recorded as occurring in Colorado, Vancouver, and California while the other two are described from California.

To these three species are here added descriptions of three additional ones, together with a table including all known species. In the preparation of these records I am greatly indebted to Dr. H. C. Fall for his helpful advice and for the privilege of describing two of the following species which are in his collection.

Orobanus montanus Mank, new species

Figures 1-3

Brownish in color, head and abdomen darker, legs and antennæ lighter. Eyes small, distinctly more than their own length from the base, coarsely granulate, not more prominent than the tempora which appear swollen (Fig. 3.). Front flattened between base of antennæ but convex posteriorly. Front and deepest parts of lengthwise grooves coarsely hairy as is also the labrum. Two frontal impressions deepest opposite middle of the eyes, grooves more shallow posteriorly. Third joint of maxillary palpi more swollen than in other species of Orobanus. Antennal joints thicker than in other forms of the genus. First joint cylindrical, less than the length of the second and third combined; second very slightly shorter and stouter than the third; three to six subequal; seven to ten gradually diminishing in length but slightly thickened; eleven less than nine and ten combined. Prothorax wider than long at a point one-third of the distance from the apex; width at base about equal to length and slightly wider than greatest width of the head; sides deeply incurved from widest point to base. Punctures shallow but fairly dense. Base definitely margined. Lateral fovea deepest posterior to widest part of the prothorax. Combined elytra slightly wider than the sutural length, not quite as long as prothorax. Humeri not rounded but oblique. (Fig. 1.). Wing covers separately rounded at apex. Pubescence fairly long, recumbent. First joint of hind tarsus longer than the second but not so long as the second and third combined (Fig. 2.). Length, from anterior margin of prothorax to end of elytral suture, 1.5 mm.; width, 1.2 mm.

Described from two specimens taken by myself under stones on the shore of Lake St. Mary near Sun Camp, Glacier National

Park, Montana. The type is a male collected on July 18, 1924. The second specimen is a female taken in the same locality July 15, 1929.

This differs from the other species of Orobanus in its smaller eyes, more swollen tempora, less prominent humeri, thicker antennal joints, and in having the first joint of the hind tarsus not as long compared with the second and third as in the other species.

Orobanus mormonus Mank, new species

Figures 4-6

Surface alutaceous, pubescence moderate, recumbent. Eyes small, not more prominent than the tempora, distant from base more than their own length (Fig. 6.). Head finely alutaceous and dull, punctulate on front between impressions. Lengthwise impressions extending beyond the ocelli. Antennæ slender; first joint cylindrical, slightly longer than the second; two to four subequal; five to eight gradually shorter in length; nine and ten together greater in length than eleven; eleven decidedly pointed. Third joint of maxillary palpi moderately wide as in *simulator*. Prothorax wider than long, widest at a point slightly more than one-third the distance from the anterior margin, lateral margin sinuate from widest point to the base. Basal margin thickened but not punctured. Humeri not rounded but oblique. (Fig. 4.). Sutural length subequal to the combined width of the elytra at the widest point. Pubescence not as thick as in *simulator*. First joint of hind tarsus longer than two and three combined. (Fig. 5.). Length, from anterior margin of prothorax to the end of elytral suture, 2.0 mm.; width, 1.4 mm.

Described from three specimens from the cabinet of Dr. H. C. Fall. The type is a male bearing the label Ogden Ut. 7.3.

Orobanus mormonus approaches *montanus* in the small size of its eyes and also resembles that species in its oblique humeri. The width of the antennal joints, the maxillary palpi, and the hind tarsal joints resemble *simulator*.

Orobanus falli Mank, new species

Figures 7-9

Color, mahogany brown; surface shiny; pubescence silken, yellowish brown. Eyes somewhat prominent, moderately granulated, distant from base about equal to their own length, more prominent than the tempora (Fig. 7.). Punctures on front between two lengthwise impressions sparse but deep; more numerous in the impressions and between them and the eyes. Surface of head very shiny. Antennæ slender. First joint cylindrical and thickened; second shorter than the following segments but equal to them in

width; three to six subequal; seven to ten slightly wider and gradually diminishing in length; eleventh about equal in length to nine and ten combined. Prothorax distinctly wider than long. Definitely punctured with an irregular row of large punctures anterior to basal margin and extending along the sides to the lateral foveæ. Well rounded humeri. (Fig. 7.). Sutural length greater than the width of the combined elytra. Pubescence long, coarser than in *simulator* and less recumbent. Punctures not as deep as on head, but distinct; distant from one another more than their own diameter. First joint of posterior tarsus fully twice as long as the second and third combined (Fig. 8.). Length, from anterior margin of prothorax to end of elytral suture, 1.9 mm.; width, 1.1 mm.

Described from a pair taken by J. O. Martin in Redwood Park, Contra Costa Co., California, and bearing the label 8-10-18. The type is a male. Both specimens are in Dr. Fall's cabinet.

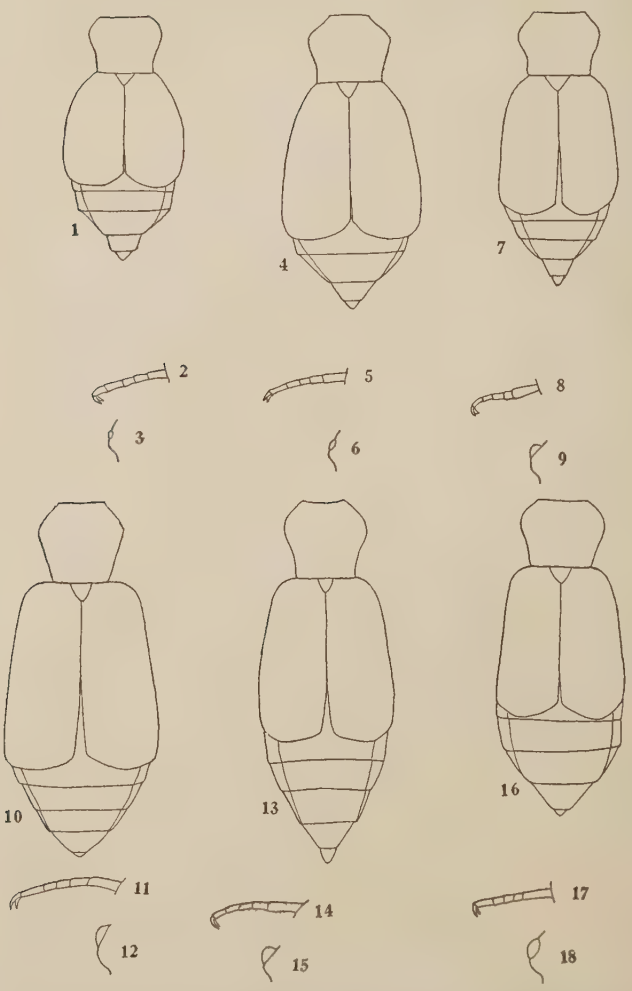
Orobanus falli differs from all other species of Orobanus in its more shiny surface, deeper punctuation, and in the distinct line of punctures along the basal margin of the prothorax.

The following table includes all known species.

A. Eyes small, more than their own length from the base; tempora swollen, humeri oblique.
  b. First joint of hind tarsus less in length than second and third combined; surface punctate....*montanus* n. sp.
  bb. First joint of hind tarsus greater in length than second and third combined; surface alutaceous, minutely punctulate.....*mormonus* n. sp.

AA. Eyes somewhat prominent, hardly more than their own length from base of head; humeri at least moderately prominent; first joint of hind tarsus distinctly longer than the second and third combined.
  b. Surface shining; pubescence sparse; row of large punctures anterior to basal margin of the prothorax.....*falli* n. sp.
  bb. Surface not shining; pubescence at least moderately abundant.
    c. Punctuation and pubescence dense; humeri broadly exposed.....*densus* Clay
    cc. Punctuation and pubescence moderately abundant; humeri broadly exposed.
      d. Sides of thorax more deeply sinuate; form somewhat more slender; legs paler....*rufipes* Csy.
      dd. Sides of thorax less deeply sinuate; legs dark....*simulator* Lec.

The cut illustrates the general form of each species together with drawings of the hind tarsus and the side of the head.



Figures 1-3 Orobanus montanus
Figures 4-6 Orobanus mormonus
Figures 7-9 Orobanus falli
Figures 10-12 Orobanus densus
Figures 13-15 Orobanus rufipes
Figures 16-18 Orobanus simulator

ON TWO SPECIES OF FALSE SCORPIONS COLLECTED BY BIRDS IN MONTANA, WITH NOTES ON THE GENUS DINOCHEIRUS

(Arachnida—Chelonethida)

BY JOSEPH CONRAD CHAMBERLIN

Associate Entomologist U. S. Bureau of Entomology, Twin Falls, Idaho

Introduction

Through the courtesy of Dr. R. V. Chamberlin of the University of Utah, it has been the writer's privilege to examine a small collection of chelonethids taken from the stomach contents of the nighthawk (*Chordeiles minor*) in Montana. Two species, both of which have been previously undescribed, occur in the collection, representing the families Cheliferidæ and Chernetidæ respectively. In the case of the chernetid (*Pachycheirus instabilis*) an additional specimen was available which was of interest in that it was taken on a cerambycid beetle.

Family CHERNETIDÆ Chamberlin

Pachycheirus Chamberlin, genus nov.

Orthotype. *Pachycheirus instabilis* sp. nov.

Diagnosis. Chernetid closely related to *Dinocheirus*, from which it differs in the chætotaxy of the chela and chelicera, and possibly in the normal number of blades comprising the flagellum.

Pleural membrane stellately granulate (fig. 1, J); all tergites and sternites except the eleventh divided by a broad papillately roughened interscutal stripe; scuta well separated inter-segmentally and inter-scutally, more or less deliquescently merging into the surrounding membranes; posterior tergites somewhat "recurved" around the eleventh segment. Carapace with eye-spots indistinct or absent; with two well defined transverse furrows, both of which are evenly procurved, the anterior furrow nearly median but the posterior furrow lying midway between the anterior furrow and the posterior margin of the carapace. Tergites, carapace, and palps evenly granulate and vestitured by stout denticulate setæ (fig. 1, R and S); tergites uniseriately bordered by 14 to 16 setæ; palps very stout (fig. 1, Y) and probably sexually dimorphic as in *Dinocheirus;* chela with accessory teeth strongly developed interiorly and exteriorly, sense spots abundant, most especially on the interior face of the fixed finger; chætotaxy of fixed finger (fig. 1, X as compared with Q and Z) fundamentally

as in *Dinocheirus* except that IT and IST are somewhat more closely associated than in that genus; chætotaxy of movable finger differing from *Dinocheirus* in that T and ST are relatively more basally situated, with ST at least as near SB as T, which thus stands alone; B and SB closely associated, about two areaolar diameters apart; dental profile of female fingers morphologically modified, being basally crested on the fixed finger and sub-distally excavated on the movable finger (fig. 1, X as compared with Q). Cheliceræ typical in general morphology; chætotaxy normal, seta SB slender and completely simple and acute (fig. 1, V) in which it differs from *Dinocheirus* (fig. 1, T. U, and M); flagellum with either three or four blades (fig. 1, N, O, P, and W), both numbers occur within the single species upon which the genus is founded, the "normal" number not yet definitely known, but very likely four; galea probably sexually dimorphic as in *Dinocheirus;* lamina interior with three dentate sub-apical lobes. Legs normal; coxal area normal; fourth tarsus (fig. 1, F) with a slender acuminate pseudotactile seta placed distinctly distad of median as in *Dinocheirus.* Female genital area as in *Dinocheirus.* Tracheal trunks smoothly striate.

Remarks. Only the orthotype is assigned to this genus for the present but it undoubtedly includes other western American species as well. The characteristics in which the genus differs from *Dinocheirus* are stated briefly in the following couplet.

1. ST as close to SB as to T and situated clearly proximad of median (fig. 1, X); T about as close to finger tip as to ST; sub-basal seta of chelicera simple and acute (fig. 1, Y). Chela of female gaping, the dental contour of the finger plainly morphologically specialized (fig. 1, X)..*Pachycheirus* genus nov.
— ST much closer to T than SB and situated clearly distad of median; T much closer to ST than finger tip (fig. 1, Q and Z); sub-basal seta of chelicera variously and distinctly dentate (fig. 1, T, U, and M). Female chela not gaping, the dental profile of fingers normal (fig. 1, Q).....*Dinocheirus* Chamberlin

Pachycheirus instabilis Chamberlin, sp. nov.

(Fig. 1, F, J, K, L, N, O, P, R, S, V, W, X, and Y).

Holotype. Female (JC-795.02001); paratypes 3 females, (JC-795.02002-4), all from "the alimentary tract of the nighthawk (*Chordeiles minor*). Collected at Sula, Montana. Labelled "187322, *Chordeiles.*" Submitted for determination by Dr. R. V. Chamberlin. Additional paratype 1 female (JC-637.01001) from a spondylid (Cerambycid) beetle, Florence, Montana, collected June 17, 1916, by H. L. Seamans, studied through the

courtesy of Prof. R. A. Cooley. Only the female of this species is thus far known.

Diagnosis. Eye-spots poorly defined or absent. Carapace longer than broad behind (measurements exclude membranous areas); anterior furrow median and smoothly procurved; posterior furrow mid-way between anterior furrow and posterior margin of carapace, also smoothly procurved. Tergites bordered by 14 to 18 setæ, the median scuta also bearing at least a lateral and a median seta in advance of the normal border series. Sternites with chætotaxy similar to that of tergites except that there are 18 to 22 simple acute setæ in the marginal series; stigmatic plates small and non-setose. Galea of female comprising a slender shaft with six more or less curved simple branches (fig. 1, K); flagellum very variable in structure, with either three or four blades (one specimen JC-795.02002) has one chelicera with a 3-bladed, the other with a 4-bladed, flagellum (fig. 1, O and W) which are variously dentate (figs. 1, N, O, P, and W). Palps robust (fig. 1, X); trochanter with a prominent sub-dorsal conical "heel" 1.50-1.55 times as long as broad; femur strongly pedicellate, scarcely longer than tibia or hand and 2.45 to 2.5 times as long as broad; tibia very slighter shorter than femur and slightly longer than hand, 2.1 times as long as broad; chela more prominently swollen interiorly than exteriorly and 2.1 to 2.2 times as long as broad; hand much longer (as 53 is to 45 or 46) than fingers, shorter than tibia, sub-equal to fourth pedal femur (pars basalis plus pars tibialis), only slightly broader than deep and 1.3 times as long as broad. Fourth pedal femur as long as hand and 3.25 times as long as deep; tibia 3.5 times as long as "broad"; tarsus 4 times as long as broad. Chela as illustrated (fig. 1, X), distinctly but slightly gaping when closed and showing marked modifications of the dental contour; fingers with 33 to 35 marginal teeth each; accessory teeth number 6 or 7 interiorly and about 10 exteriorly on either finger. Sense spots most abundant interiorly on both fingers; fixed finger interiorly with a moderately well defined sub-basal cluster of about a dozen spots, which anteriorly extends forward on the finger in two stragglingly parallel rows as far as IT, about 30 or so spots in all; exteriorly the spots are fewer, arranged as shown in figure (fig. 1, X), and numbering about 5 in all; movable finger with a straggling series of six or seven spots interiorly extending from opposite B to the nodus ramosus of the venom apparatus; exteriorly with two or three spots (fig. 1, X). Chætotaxy of genital area typical, comprising a loose central cluster of a couple of dozen setæ and a border series of about 16; spermathecæ conspicuous and much coiled. Length of adult female 3.5 mm. (potassium hydroxide expanded) to 2.8 mm. (non-expanded); abdominal breadth (non-expanded female) 1.35 mm. Length of chela 1.28 mm.

Remarks. It is unfortunate that no male of this species has been available for study. It is almost certain, however, that the palpal proportions will be reasonably close to those described for the female except for the chela, which will in all probability be much heavier (as in *Dinocheirus*). The variable morphology of the flagellum is unique and the apparent instability of this character for this species must be considered in employing this organ for the definition of generic and tribal groups.

In one specimen, an abnormal galea (fig. 1, L) occurs in which the branching tip is strongly deformed. It is still 6-branched as in the normal galea (fig. 1, K).

DINOCHEIRUS Chamberlin

(Fig. 1, D, E, G, M, Q, T, U, and Z)

1929. *Dinocheirus* Chamberlin, Pan Pacific Entomologist 5; p. 171.
1931. *Dinocheirus* Chamberlin, The Arachnid Order Chelonethida (Stanford University Press); p. 242, figs. 16, H, P; 18, K, L; 20, H; 30, H, I.
1932. *Dinocheirus* Chamberlin, Beier, Zool. Jahrb. Syst. 63; (in press)
1932. *Epaphochernes* Beier, t.c. (in press)

Remarks. Through some oversight the flagellum of *Dinocheirus* was not noted in the original characterization of this genus (Chamberlin, 1929). Later, however, (Chamberlin, 1931, p. 73 fig. 16-H), it was figured in connection with another study. It is definitely 4-bladed and consequently the genus falls into Beier's *Hesperochernetini* and not his *Chernetini* as indicated by him (t. c.) *Chelanops arizonensis* Banks, the orthotype of Beier's *Epaphochernes* (tribe *Hesperochernetini*), is without question congeneric with *Dinocheirus tenoch*, the type of *Dinocheirus*, and in consequence Epaphochernes necessarily falls as a synonym of *Dinocheirus*. Some additional figures of *Dinocheirus tenoch* and *Dinocheirus arizonensis* are given herewith in order to facilitate a comparison of the genera *Dinocheirus* and *Pachycheirus* genus nov. See discussion under *Pachycheirus*.

CHELIFERIDÆ Hagen

PARACHELIFER Chamberlin

1931-32. *Parachelifer* Chamberlin, Canadian Entomologist, 64; p. 19.

Diagnosis (emended). *Male.* Coxal spurs pronounced. Coxal sacs typical of the subfamily. Genital structure typical of subfamily. Tergal crests pronounced; fore tarsus (fig. 1, H and L) strongly modified, definitely swollen proximad of the pronounced tarsal spine; claws strongly asymmetrical, one only slightly distorted and simple, the other strongly distorted and with a single, well developed, dorsal spur or tooth (fig. 1, I). Galea stylet-like.

Female. Genital operculum and cribriform plates typical of subfamily. Galea branched.

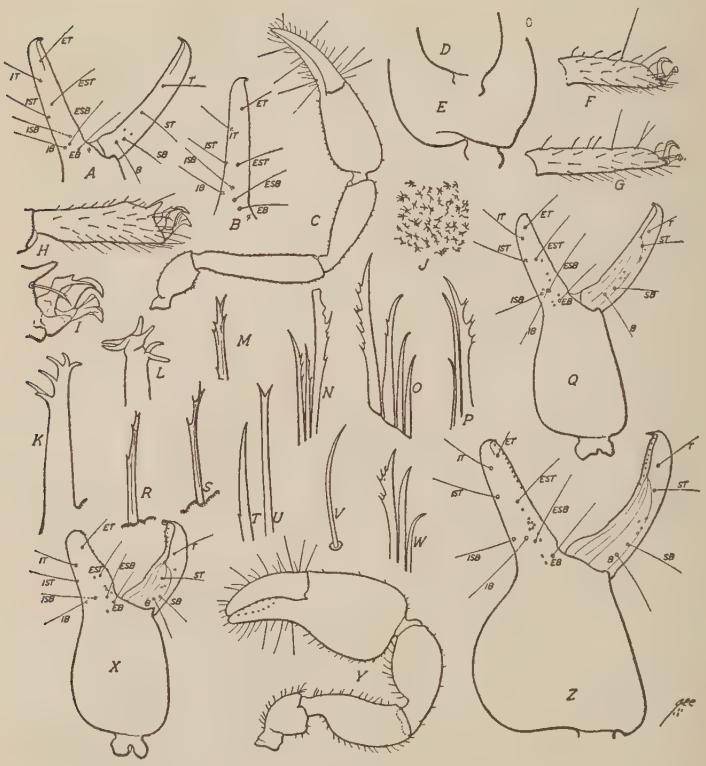
Both sexes. Tarsal claws each with a distant ventral spur (bifid); tarsal subterminal, setæ dentate (fig. 1, I). Sub-basal and basal setæ of chelicera both present, short, and generally at least apically denticulate. Carapace with eyes; both carapacal furrows distant, the anterior one sub-median in position, the posterior one a tergal length anterior to the posterior margin; carapace broader than long. All tergites and sternites longitudinally divided by a linear suture. Carapace and palps evenly granulate, frequently (usually) with larger setose tubercles. Tergites and sternites squamotessellate; uniseriately setose. Vestitural setæ of palps, carapace, and tergites very short, stout, semiclavate, and terminally more or less denticulate. Chætotaxy of chela as shown in fig. 1, A. Pleural membrane finely plicate (longitudinally striate), the striæ not smoothly parallel. General facies typically cheliferoid.

Parachelifer montanus Chamberlin, sp. nov.

(Fig. 1, A, B, C, H, and I).

Holotype, male (JC-795.01001); paratype, male (JC-795.-01002) both from the alimentary tract of the nighthawk, from Sula, Montana. The collection bears the additional label "187322-*Chordeiles*." Submitted for determination by Dr. R. V. Chamberlin.

Diagnosis. Typical *Parachelifer* closely related to *persimilis* (Banks). Subterminal setæ (fig. 1, I) strongly curved distally and with the dorsal tooth much better developed than the ventral one, which may indeed be apparently lacking, in some cases even on the same specimen; larger tubercles of carapace and palps much reduced in size and few in number, practically vestigial (fig. 1, C); carapace and first ten tergites of male with distant tergal crests which become progressively reduced posteriorly; tergites bordered by 12 to 14 setæ exclusive of those developed upon the tergal spurs; basal and sub-basal setæ of chelicera very obscurely denticulate or possibly even acuminate; anterior stigmatic plate non-setose; posterior plate with a single seta. Carapace distinctly broader behind than long. Chætotaxy of chela (fig. 1, A and B)



DESCRIPTION OF FIGURE

Parachelifer montanus sp. nov. A, extero-lateral aspect of right chela (male paratype); B, extero-lateral aspect of fixed finger of right chela, (holotype); C, ventral aspect of left palp. H, fore-tarsus of male (holotype); I, same, details of claws, etc.

Dinocheirus arizonensis (Banks). D, E, dorsal aspects of base of hand of chela (same scale) showing relative difference in size of female and male chela respectively. Q, exterior lateral aspect of right female chela (same scale as fig. Z); T and U, two different aspects of sub-basal seta of chelicera; Z, exterio-lateral aspect of right chela of male (same scale as fig. Q).

Dinocheirus tenoch Chamberlin. G, fourth tarsus of male specimen showing position and nature of pseudotactile seta; M, tip of sub-basal seta of chelicera.

fundamentally as in the genus but showing some variants; B and SB of movable fingers sub-adjacent, not more than two areolar diameters apart; T opposite nodus ramosus; EST nearly or quite opposite IST (the two specimens vary in this, compare fig. 1, F and B), at most only two areolar diameters anterior thereto; ISB and IB obliquely opposite, with IB proximad of ISB; ESB more or less proximad of IB; movable finger with 48, fixed finger with 43, marginal teeth, the more basal ones of which are nearly obsolete and can be counted with certainty only by reason of the persistent dental canals. Palps (fig. 1, C) relatively robust, trochanter 1.95 times as long as broad; femur longer than carapace and 4.5 times as long as broad; tibia longer than hand and subequal to (very slightly shorter than) carapace and 3.3 times as long as broad; chela 3.4 times as long as broad; fingers very slightly shorter than (subequal to) hand, which is slightly broader than deep; fourth pedal femur (pars basalis plus pars tibialis) slightly longer than palpal hand but shorter than tibia and 3.1 to 3.2 times as long as deep; fourth pedal tibia 5.5 to 5.6 times as long as broad; swollen fore-tarsus of male (fig. 1, H) 3.2 to 3.5 times as long as broad. Length of adult male about 3.2 mm., greatest abdominal breadth about 1.7 mm. (potassium hydroxide treated). Palpal femur 1.2 mm. long.

Remarks. This form is most readily separable from *persimilis* (Banks), its nearest congener, by the stouter palpal proportions. The two are compared in the following couplet. It is drawn up upon the basis of males of the two species only. I have examined two male specimens (JC-221.01001 and 2) of *persimilis* from New Mexico through the courtesy of Dr. R. V. Chamberlin, then of the Museum of Comparative Zoology at Cambridge.

Pachycheirus instabilis genus et species nov. All drawings from female. F, fourth tarsus showing pseudotactile seta; J, detail of pleural membrane showing stellate wrinkles; K, normal galea (JC-795.02003); L, abnormal galea (JC-795.02002); N, O, P, and W, flagella drawn from various specimens (JC-795.02003), left chelicera: (JC-795.02002), left chelicera; (JC-795.02001), left chelicera; and (JC-795.02002) right chelicera, respectively) showing some of the variations in this structure as they occur in this species; R and S, vestitural setæ from the dorsum of the fourth femur and tibia respectively; V, sub-basal seta of chelicera; X, extero-lateral aspect of right chela; Y, ventral aspect of left palp.

1. B and SB of movable finger sub-adjacent, not more than two areolar diameters apart; ISB and IB obliquely opposite and clearly more or less anterior to ESB; EST transversely to obliquely paired with IST and not more than two areolar diameters distad thereof (fig. 1, A and B); movable finger with 48, and fixed finger with 43, marginal teeth; palps relatively robust, femur 4.5, tibia 3.3, and chela 3.4 times as long as broad respectively; hand and fingers subequal in length, with hand tending to be slightly the longest....*montanus* sp. nov.
— B and SB not closely associated, about four areolar diameters apart; ISB and IB transversely opposite each other and directly opposite ESB; EST well anterior of IST (about four areolar diameters); movable finger with 57, fixed finger with 53, marginal teeth; palps relatively slender, femur 5.2 to 5.4, tibia 3.8, and chela 3.9 to 4.0 times as long as broad; fingers slightly but distinctly longer than hand.....*persimilis* (Banks)

ANTS FROM THE ISLANDS OFF THE WEST COAST OF LOWER CALIFORNIA AND MEXICO

BY WILLIAM MORTON WHEELER

The following paper deals with a small but important collection of Formicidæ made by Mr. H. H. Keifer in 1925 on Guadalupe, Cedros, San Martin and Isabel Islands, and the Tres Marias and Revillagigedo archipelagos during the 1932 expedition of the California Academy of Sciences. The collection comprises 28 forms, including eight which were previously undescribed. All belong to well-known Mexican genera and, like those of the Galapagos Islands and Cocos Island, recorded in previous papers, are members of the neotropical fauna, excepting *Aphænogaster patruelis* and *Camponotus keiferi* from Guadalupe Island, which are more closely related to certain nearctic or palearctic species (*Aphænogaster subterranea* and *Camponotus castaneus*). Some of the insular forms are sufficiently different from their nearest continental allies to reveal a certain amount of endemicity, which on further exploration may prove to be greater than our present knowledge indicates.

Lower California

Aphænogaster patruelis Forel.

Numerous workers and two males taken on the north end of Guadalupe Island (IV.20.'25) may be regarded as topotypes of the typical forms of this ant.

The male (undescribed) measures about 3.5 mm. Head through the eyes slightly wider than long, broadly rounded behind, with very short cheeks. Mandibles well-developed, 6-toothed. Antennal scapes nearly four times as long as broad; funiculi long, the four terminal joints elongate, each constricted at its base and, with the exception of the terminal joint, also at its apex. Thorax long, through the wing-insertions broader than the head; mesonotum large, subhexagonal, as broad as long, anteriorly very convex and projecting, depressed posteriorly just in front of the scutellum; epinotum small, low and narrow, in profile with long, medially somewhat concave base and short, abrupt declivity, the two surfaces meeting at a right-angle. Petiole and postpetiole much as in the worker, but the nodes lower and more rounded. Gaster like that of the worker; legs more slender; hind tibiæ slightly bent near the base. Sculpture and color as in the worker, but the body darker, nearly black; pilosity even less developed. Wings slightly brownish; veins brown; pterostigma dark brown.

The subsp. *willowsi* Wheeler (1933), from San Nicolas Island, one of the Santa Barbara Islands, California, differs from the typical *patruelis* only in the less convex base of the epinotum, less developed sculpture and somewhat paler coloration.

I have recently examined Pergande's specimens of the subsp. *carbonaria* from Sierra Laguna (type-locality) and El Chinche, Lower California. The worker differs from the typical *patruelis* in somewhat larger size and in having decidedly longer antennal scapes and funicular joints and the base of the epinotum less convex, with a pair of short ridges at the posterior end, terminating in sharp angles instead of acute denticles as in the typical form. Both petiolar and postpetiolar nodes are higher and more conical, the color is darker, the body being black and less reddish, and the legs and scapes darker brown; the hairs on the appendages, especially on the flexor surfaces of the femora and tibiæ are much more developed; the frontal area is sharply carinulate in the middle, the head more abundantly rugulose and the clypeus and mandibles more coarsely rugose.

Among the Pergande specimens there is an undescribed, deälated female from El Chinche, which has lost its abdomen. The thorax is scarcely wider through the wing-insertions than the head through the eyes, and is shaped much as in the male of *patruelis sens. str.*, but the epinotum bears two large, stout spines, which are somewhat longer than broad at their bases. Head coarsely rugose throughout, the rugæ longitudinal on the clypeus and cheeks but strongly and sinuously diverging on the front and curving outward to the rounded posterior corners of the head, where they are

joined by rugæ diverging from between the lateral ocelli. Pronotum transversely, sides of epinotum longitudinally, its base and declivity transversely and sharply, rugose; mesonotum smooth and shining, with a few fine converging rugules at its posterior end; scapes and legs with sparse piligerous punctures. Color and pilosity as in the worker.

Carbonaria, originally described as a species was reduced to subspecific rank by Forel (1899), but it and *patruelis* may eventually prove to be specifically distinct.

Pheidole hyatti Emery

Five soldiers, two workers and a dealated female from San Martin Island (VI. 8. 1925). This species is common in Southern California.

Solenopsis geminata Fabr.
subsp. maniosa Wheeler

A single worker from Cedros Island. This is the common form of *geminata* in Southern California.

Leptothorax (Goniothorax) peninsularis Wheeler, sp. nov.

Female. Length about 5 mm.

Head subrectangular, slightly longer than broad, nearly as wide anteriorly as posteriorly, with rounded posterior corners and straight posterior border. Eyes convex, at the middle of the sides. Mandibles small, with straight external borders and about six small teeth. Clypeus convex, its anterior border straight and transverse in the middle, sinuate on each side. Antennæ 12-jointed; scapes reaching somewhat beyond the posterior corners of the head; funiculi with joints 2 to 6 as long as broad, remaining joints longer than broad, the last three forming a distinct club, with the basal two joints subequal and together as long as the terminal joint. Thorax large and robust, broader than the head; pronotum with prominent, rectangular but not acute humeri; mesonotum and scutellum flattened above, the former subhexagonal, very nearly as broad as long; epinotum with somewhat convex base, shorter than the perpendicular declivity; spines large and stout, acute, longer than their basal diameter, but shorter than their distance apart. Petiole with well-developed peduncle and stout anteroventral tooth; node subcuboidal, slightly broader than long, its laterosuperior border distinctly denticulate anteriorly; postpetiole much

broader than the petiolar node, from above transversely rectangular, nearly twice as broad as long, its posterior border emarginate in the middle. Gaster large, elliptical, with straight anterior border. Wings with large pterostigma, small discoidal cell and very short, closed marginal cell.

Subopaque; venter smooth and shining; mandibles very finely striate; clypeus and head longitudinally and rather finely rugulose, the rugules becoming more reticulate laterally and posteriorly. Pronotum, mesonotum and scutellum evenly rugulose and glossy, the rugules on the pronotum transverse anteriorly, longitudinal on the sides and on the mesonotum and scutellum; remainder of thorax finely punctate-rugulose; the epinotal declivity anteriorly and posteriorly very finely and transversely rugulose. Gaster above and appendages very finely and densely punctulate; bases of the second and following gastric segments smooth and shining.

Hairs pale yellowish; numerous, obtuse and very short on the head and thoracic dorsum, somewhat longer on the gaster. Scapes and legs with very fine, short, appressed pubescence.

Ferruginous; mandibles, clypeus, cheeks, sutures of thorax and legs brownish yellow; ocellar area fuscous; wings faintly tinged with yellow; veins brown; pterostigma darker brown, especially along its posterior border.

Two specimens taken at Magdalena Bay, Lower California (V.30.'25). They are much larger than any of the other Goniothorax females I have seen. I have described them without the workers because they can be very readily recognized. At first sight they seem to be referable to the genus Macromischa, which is very closely related to Leptothorax. The shape of the marginal cell is characteristic and exactly like that of the North African *L. rottenbergi* Emery, which belongs to a group in certain respects intermediate between Leptothorax and Macromischa. The worker of *peninsularis*, when discovered, will probably be found to resemble the Brazilian *L. sculptiventris* Mayr, which might be placed in the genus Macromischa.

CREMATOGASTER (ACROCŒLIA) LINEOLATA Say subsp. CALIFORNICA Emery

I refer five workers from Magdalena Bay, Lower California (V.30.'25) and a dozen from San Martin Island (VI.8.'25) to this form. They agree closely with Emery's brief description of specimens from Encenitas and Los Angeles, California. He says

that *californica* combines the robust stature of the subsp. *lævius-cula* Mayr with a very aberrant sculpture like that of the subsp. *coarctata* Mayr. "The head is opaque, only the front being somewhat shining but otherwise with dense, longitudinally confluent punctuation. Thorax and pedicel entirely opaque, very densely punctate, only the declivity of the epinotum shining, its base coarsely, irregularly and longtitudinally striate. Pubescence of the tibiæ and scapes as in *lævius-cula*."

On examining the Crematogaster material from various Californian localities in my collection, I find considerable variation in all the characters mentioned by Emery. The status of *californica*, which he regarded as a variety of *lævius-cula*, must therefore remain in doubt till a special study of a large amount of material from numerous localities can be undertaken. I regard it provisionally as a variable subspecies of *lineolata*.

The specimens from Magdalena Bay seem to be almost typical *californica*. The antennal scapes are shorter than in *coarctata*, the epinotal spines long, divergent and feebly sinuous, but the sculpture of the head is variable and the epinotal declivity either smooth and shining or opaque and densely punctulate. The pubescence of the scapes and tibiæ is abundant, oblique and as long as in the subsp. *lævius-cula*, but shorter than in our Eastern subsp. *pilosa* Pergande. The appressed pubescence on the head and gaster is conspicuously long. The base of the gaster is reddish brown like the thorax.

The specimens from San Martin Island average smaller and have shorter, straight, epinotal spines and the petiole is distinctly broader than long, the gaster in most individuals black throughout, the legs darker than in the series from Magdalena Bay.

Crematogaster (Acrocœlia) lineolata subsp. cedrosensis Wheeler, subsp. nov.

Worker. Length 3-3.5 mm.

Related to the subsp. *lævius-cula*, but differing as follows: Smaller and less robust, with smaller head and narrower thorax, the mesoëpinotal constriction less pronounced both dorsally and laterally; the carina on the mesonotum shorter, very prominent and often tooth-like in profile; epinotal spines much shorter, not longer than the base of the epinotum, very thin and acute, straight and

much less diverging posteriorly; petiole narrower, trapezoidal, less cordate anteriorly. Smoother and more shining than *læviuscula*, but cheeks and clypeus more sharply longitudinally rugulose, petiole subopaque and finely punctate. Pubescence on scapes and legs less abundant, finer and appressed. Color much darker, being castaneous brown, with darker head; antennal clubs and gaster, except at the base, black; legs slightly paler brown than the thorax.

Eight specimens from Cedros Island (VI.5.'95).

Camponotus (Camponotus) keiferi Wheeler, sp. nov.

Worker major. Length 7-8 mm.

Head rather small, subtrapezoidal, longer than broad, narrowed anteriorly, with straight sides and feebly and broadly excavated posterior border. Eyes moderately large and convex. Mandibles stout and convex, 6-toothed. Clypeus subcarinate at the base, its anterior border neither lobed nor produced, slightly emarginate in the middle. Frontal area small, transversely trapezoidal, frontal groove distinct; frontal carinæ sigmoidal. Antennal scapes extending nearly two-fifths of their length beyond the posterior corners of the head, slender and feebly flattened but not dilated at the base. Thorax of the usual shape, the pronotum, mesonotum and base of the epinotum forming an even curve in profile; pronotum flattened above, anteriorly semicircular, submarginate at the sides; metanotal sclerite distinct, bounded by a suture posteriorly; epinotum strongly compressed laterally, in profile with the base straight and rather strongly sloping, forming a distinct obtuse angle with the slightly shorter, perpendicular and somewhat concave declivity. Petiolar scale rather broad, convex both anteriorly and posteriorly, the superior border not very acute, from behind feebly convex as are also the lateral borders. Legs moderately long, fore femora enlarged; hind tibiæ somewhat flattened but not grooved, their flexor surfaces without bristles.

Smooth and shining, microscopically shagreened and with small, sparse, piligerous punctures; anterior portion of head less shining and distinctly though minutely and densely punctulate, clypeus and adjacent portions of cheeks also with sparse piligerous foveolæ, the more posterior portions of cheeks with small, non-piligerous punctures. Mandibles sharply punctate; antennal scapes subopaque, finely punctulate.

Hairs golden yellow, moderately long, very sparse, erect, absent on the scapes and legs, except at tips of femora. Pubescence undeveloped, except on the tibiæ, where it is extremely fine and appressed.

Brownish yellow; gaster brown above; head, mandibles and scapes castaneous; funiculi red; mandibular teeth black; coxæ, femora and palpi yellow; knees, tibiæ and tarsi somewhat darker and more reddish; posterior borders of gastric segments yellowish.

Worker minor. Length 5.5-6 mm.

Very similar to the major, except in having the head smaller and narrower, though with anteriorly converging sides, with straight posterior border, larger and more convex eyes, more convex and more distinctly subcarinate clypeus, proportionally longer antennal scapes, less sigmoidal frontal carinæ. Pilosity, sculpture and color as in the major, but the head is more shining anteriorly, with less distinct punctures, the gaster darker brown.

Described from four major and two minor workers taken on the south end of Guadalupe Island (IV.20.'25).

This form closely resembles the typical *C. castaneus* Latr. of our Eastern States but is quite distinct, being much smaller, with a narrower head, distinct metanotal sclerite in the major worker, a much more acute petiole, no bristles on the flexor surfaces of the hind and middle tibiæ, etc.

CAMPONOTUS (MYRMOBRACHYS) PHYTOPHILUS Wheeler (MS)

Two minor workers from Magdalena Bay (V.30.'25). I have recently described this species from Cuernavaca, Mexico.

ISABEL ISLAND, SINALOA

PSEUDOMYRMA PALLIDA F. Smith

Six workers (V.24.25) of rather small dimensions.

MONOMORIUM PHARAONIS L.

Numerous workers and a single deälated female (V.24.'25).

CREMATOGASTER (ORTHOCREMA) BREVISPINOSA Mayr subsp. MINUTIOR Forel.

Six workers (V.24.'25).

CAMPONOTUS (MYRMOTHRIX) ABDOMINALIS Fabr. subsp. ESURIENS F. Smith

The female and male taken by Mr. M. Willows, also on Isabel Island (III.27.'32) and mentioned in my former paper (1933) probably belong to this species.

TRES MARIAS ISLANDS

ODONTOMACHUS HÆMATODA L. subsp. INSULARIS Guérin

Seven workers from the village on Maria Madre Island (V.21.'25) are very similar to the common form of this ant from Florida and the West Indies.

PSEUDOMYRMA GRACILIS Fabr. var. MEXICANA Roger

A single worker from the village on Maria Madre Island (V.21.'25).

PSEUDOMYRMA PALLIDA F. Smith

A single worker from the village on Maria Madre Island (V.16.'25).

PSEUDOMYRMA ELONGATA Mayr

A worker and a deälated female from Maria Madre Island (V.20.'25) agree closely with specimens from Florida and the West Indies but are decidedly smaller. They may, therefore, represent a distinct subspecies.

PSEUDOMYRMA SUBTILISSIMA Emery

Two workers from the village on Maria Madre Island (V.15.'25).

CREMATOGASTER (ACROCŒLIA) OPACA Mayr

A worker and a deälated female from Maria Madre Island.

Numerous workers from the village on Maria Magdalena Island (V.21.'25). These specimens vary greatly in size, from 2.6 to 4.5 mm. Mayr's type was intermediate, measuring 3.5 mm. The well-developed epinotal spines in the specimens before me are strongly divergent, straight or somewhat incurved, but not subparallel as described by Mayr. The frontal area is larger and surrounded by more pronounced sutures than in the various subspecies of *C. lineolata* and the mesonotum is not carinate. There can be no doubt that *opaca* is a valid species and not a subspecies of *lineolata*.

CREMATOGASTER (ORTHOCREMA) SCULPTURATA Perg. subsp. PHYTOECA Wheeler (MS)

Four workers from Maria Magdalena Island (V.20.'25) and one from Maria Madre Island (V.21.'25). I have recently described this ant from Mirador, Vera Cruz, Mexico.

Cryptocerus pilosus Emery subsp. **insularis** Wheeler, subsp. nov.

Worker minor. Length 4.3 mm.

Differing from the typical *pilosus* in having the three lateral teeth of the pronotum longer and more acute, the mesonotum neither projecting nor angulate on the sides, the pair of lateral teeth of the epinotum developed as short acute spines, the lateral backwardly directed spines of the petiole and postpetiole more slender and more unequal in length, and the anterior border of the gaster at the articulation of the postpetiole less concave and without angular projections and pale spots. The basal third of the gaster is finely, regularly, longitudinally striate.

A single specimen from Maria Madre Island (V.21.'25).

The type of the species which I know only from Emery's description and figures, is recorded from Paraguay, but I have specimens of a closely related form taken by Dr. W. M. Mann in Brazil. The precise rank of *insularis* cannot be decided till the soldier has been secured.

ATTA MEXICANA F. Smith

A number of media and minor workers from the village on Maria Madre Island (V.21.'25).

CAMPONOTUS (MYRMOTHRIX) ABDOMINALIS Fabr. subsp. ESURIENS F. Smith

Several major and minor workers from Maria Magdalena Island (V.20.'25).

Camponotus (Myrmepomis) sericeiventris Guérin subsp. **imperator** subsp. nov.

Worker media. Length nearly 10 mm.

Resembling the subsp. *rex* Forel in pilosity and pubescence, but the pelisse of golden pile on the gaster is somewhat less brilliant and shows no tendency to converge towards the mid-dorsal line. The erect hairs on the head, thorax and gaster are much shorter and less numerous. The humeral spines of the pronotum are more slender and more acute, the superior border of the petiolar scale sharper in profile and straight and transverse from behind. The coloration is quite unlike that of any of the other forms of this widely distributed neotropical ant, being red,

with the sides of the pronotum, the fore coxæ, meso- and epinotum blackish, the extensor halves of the middle and hind tibiæ deeper red.

A single specimen from Maria Magdalena Island (V.20.'25). The peculiar coloration cannot be due to immaturity.

CAMPONOTUS (MYRMOCLADŒCUS) RECTANGULARIS Emery
var. AULICUS Wheeler

Three workers from the village on Maria Magdalena Island (V.21.'25). Originally described from Guatemala (33).

REVILLAGIGEDO ISLANDS

Odontomachus hæmatoda L. subsp.
clarionensis Wheeler, subsp. nov.

Worker. Length about 9 mm.

Resembling the subsp. *coninodis* Wheeler of Arizona in the shape of the petiolar node, which has a very short, stout apical spine, but of larger stature and with a proportionally much larger and broader head. Posterior corners of the latter smooth and shining; striæ on pronotum concentric in the middle, transverse anteriorly and posteriorly and longitudinal on the sides. Pubescence on the thorax, petiole, gaster and legs long and conspicuous. Head, antennæ, thorax and petiole deep red, darker than in the subspecies *clara* Roger and *coninodis* but paler and less brownish than in the typical *hæmatoda*; gaster black; legs testaceous.

Three specimens from Clarion Island (IV.26.'25).

SOLENOPSIS GEMINATA Fabr.

A single small worker from Clarion Island (VI.26.'25). Mr. M. Willows took specimens of this same form on the same island (III.24.32) and also on Socorro Island (III.7.32).

Forelius fœtidus Buckley
subsp. keiferi subsp. nov.

Worker. Length 2.3—2.5 mm.

Differing from the typical form of *fœtidus* from Texas in the following characters: Color somewhat deeper and more reddish, with the legs paler, yellowish, and the last gastric segment fuscous. Head broader behind, distinctly narrowed anteriorly, posterior border somewhat more excavated; antennal scapes and legs longer, the former reaching one-fourth their length beyond the posterior

border (in the typical form only one-fifth); mesoëpinotal impression in profile deeper and more acute, epinotum more convex, evenly rounded, without distinct base and declivity; superior border of petiolar scale with a much less acute median point; tibiæ without fine oblique hairs.

Female. Length 5—5.5 mm.

Differing from the typical form in the somewhat longer and more anteriorly narrowed mesonotum, the absence of black spots at the insertions of the fore wings, much less sharply bounded dark fasciæ on the gaster, paler wing veins and absence of oblique hairs on the legs.

Male. Length about 1.8 mm.

Like the typical *fœtidus* but the head, thorax and appendages paler brown, the veins and pterostigma of the wings colorless and the scapes and legs without oblique hairs.

Described from numerous workers and four males from Grayson Cove, (V.2.25) and numerous females from Braithwaite Bay, Socorro Island (V.10.'25).

IRIDOMYRMEX PRUINOSUS Roger
var. ANALE Ern. André

Numerous workers from San Benedicto Island (V.12.'25). These agree closely with typical specimens from Northern Mexico, Texas, Arizona and California.

(CAMPONOTUS (TANÆMYRMEX) PICIPES Olivier

A dozen minor workers from Clarion Island (IV.26.'25). Minor workers of the same form were later taken by Mr. M. Willows (III.7.32) on Socorro Island, as recorded in my former paper (1933). Since the tibiæ and tarsi of both series of specimens are paler than in the typical Mexican form in my collection, they may represent a distinct variety.

Camponotus (Myrmobrachys) socorroënsis Wheeler, sp. nov.

Worker major. Length 5—5.2 mm.

Closely related to *brevis* Forel and *mina* Forel. Head moderately large, subtrapezoidal, slightly longer than broad, the posterior border nearly straight, the sides feebly rounded behind, more convex in the region of the cheeks. Mandibles stout, very convex, 6-toothed. Clypeus subrectangular, slightly longer than broad, evenly convex but not carinate in the middle. Frontal area distinct, very small, transversely trapezoidal; frontal carinæ closely approximated in front, strongly sinuate and widely divergent posteriorly; frontal groove distinct. Eyes rather large

and convex, as long as their distance from the posterior border of the head. Antennæ slender; scapes curved, extending only a distance equal to their greatest diameter beyond the posterior corners of the head. Thorax short, shaped much as in *brevis* but decidedly lower and less strongly arcuate above in profile; pronotum depressed, distinctly narrowed anteriorly and nearly as long as broad, the humeri broadly rounded, submarginate. Mesonotum trapezoidal, somewhat broader than long; epinotum small and narrow, in profile with subequal base and declivity, the former straight and sloping, forming a distinct obtuse angle with the more abrupt, slightly concave declivity. Petiolar scale thick, twice as high as long, nearly as thick above as below, with flat posterior surface, the anterior surface flat below, very convex above; seen from behind the superior border is broadly rounded, the sides straight and converging ventrally. Gaster elongate-elliptical. Legs rather short.

Mandibles, gula, posterior corners of head, coxæ and legs distinctly shining; dorsal surface of head and thorax subopaque; petiole and gaster lustrous. Mandibles finely and superficially shagreened and sparsely punctate; head and thorax finely and densely punctulate, the clypeus and cheeks also with sparse, piligerous foveolæ, which on the occiput and pronotum are replaced by sparse, coarse punctures. Gaster finely and transversely shagreened or striolate, with numerous transverse, piligerous punctures. Legs more finely shagreened than the gaster, sparsely punctate.

Hairs glistening white, erect, rather coarse, abundant and moderately long on the dorsal surface of the head, thorax, petiole and gaster; longest on the epinotum, absent on the pleuræ; on the clypeus and cheeks short, stiff and obtuse, on the legs short and obtuse, much more numerous on the tibiæ than on the femora. Antennæ with dilute, appressed pubescence, tips of scapes with a few short hairs.

Black; mandibles, antennæ and anterior third of head, including the mandibles, red; gula and fore coxæ castaneous; legs more yellowish or testaceous, terminal funicular joints and the last joint of each tarsus fuscous; mandibular teeth black.

Worker minor. Length 3.3—3.5 mm.

Very similar to the worker major, but the head much smaller and narrower, with slightly convex posterior border, more convex and more posteriorly situated eyes. Mandibles much narrower and less convex. Clypeus broader, but ecarinate as in the major. Antennal scapes nearly straight, extending half their length beyond the posterior corners of the head. Thorax like that of the major but even lower and less arcuate; pronotum semicircular, not narrowed anteriorly, distinctly marginate at the sides; base of epinotum decidedly longer than the declivity. Petiole similar to that of the major, gaster proportionally shorter.

Sculpture, pilosity and color as in the major, but the clypeus and posterior portions of the cheeks darker and more brownish, as are also the bases of the femora and the antennal funiculi beyond the first joint. Foveolæ on the clypeus and cheeks fewer and less conspicuous.

Male. Length 3.5—4 mm.

Very similar to the male of *brevis* in structure, sculpture, pilosity and color but slightly smaller and with somewhat longer antennal scapes, more strongly carinate clypeus, much narrower mesonotum and longer and more convex epinotum.

Described from five major workers, ten minor workers and twelve males taken at Grayson Cove, Socorro Island (V.4.'25).

At first sight this ant might be regarded as a small and depauperate form of *C. mina*, but it evidently represents a distinct species. The major worker can be readily distinguished from that of *mina* by the shorter antennal scapes, ecarinate clypeus, much more diverging frontal carinæ, anteriorly narrowed pronotum, finer sculpture, etc.

Editorial Notes

The entomologist of the San Francisco area have been busy as usual the past summer. Dr. E. C. Van Dyke spent three weeks in June, with his students from the University of California, collecting in the mountains about Carville, Trinity County, California, with most satisfactory results. Later he and Mrs. Van Dyke drove north through Modoc County to Klamath Falls, Oregon, returning by way of Grants Pass and the Redwood Highway. On this trip he found conditions too dry for best results. Dr. F. E. Blaisdell spent three weeks collecting about Bass Lake, Madera County, California, where he secured some interesting things notwithstanding the dry conditions. Your editor spent July on a collecting trip to Carson City, Nevada, going by way of Sonora and the Mother Lode Highway to Auburn and Truckee, with a side trip to Mono Lake, returning by way of Susanville, Mt. Lassen and Red Bluff to Grants Pass and home by the Redwood Highway. On this trip he was fortunate in having Mr. Geo. P. Engelhardt as a companion. The best collecting was found on Mt. Lassen, elsewhere the dry conditions and the cold winds in Nevada interfered much with collecting. However some interesting Hymenoptera and Diptera were secured at the exact locality where Carl F. Baker took his "Ormsby Co." types thirty years ago.